

Life cannot have had a random beginning ... The trouble is that there are about 2000 enzymes, and the chance of obtaining them all in a random trial is only one part in  $10^{40,000}$ , an outrageously small probability that could not be faced even if the whole universe consisted of organic soup.

**Fred Hoyle**

## Visionary Physicist

### THE FIRST WOMAN ELECTED CHAIR OF THE COLLABORATION BOARD OF U.S. CMS: MEENAKSHI NARAIN



Prof. Narain is a professor at Brown University and a Fellow of the American Physical Society. Prof. Narain is the elected Chair of the Collaboration Board of U.S. CMS (2018-2022). Prof. Narain created history by being the first woman to hold this elected position. She is a member of the High Energy Physics Advisory Panel which advises the Federal Government on the national program in high energy physics (2019-2022). In January 2020, she was selected to co-lead the activities of the “Energy Frontier” for the APS/DPF Community Planning Exercise to develop a 20 year future vision for particle physics research within the US.

As an experimental high energy physicist, Prof. Narain has dedicated her career to understand the particles and their interactions during the early universe in order to characterize physics at the microscopic scales. She was instrumental in the discovery of the top quark in 1995, which is the heaviest fundamental particle and as heavy as an Osmium atom. In 2012, Prof. Narain’s group had significant involvement in the discovery of the Higgs Boson. Since 2007, Prof. Narain conducts her research with the CMS experiment at the Large Hadron Collider (LHC) at CERN (Geneva, Switzerland), and has been a member of the DØ experiment at Fermilab since 1991. Prof. Narain holds a PhD degree in physics from the State University of New York at Stony Brook, where she conducted her research on the CUSB experiment about Upsilon spectroscopy. Narain was elected Chair of the USCMS Collaboration Board in June 2018 for a two-year term. In this capacity, she represents the US members collaborating on the CMS experiment in LHC. The US contingent includes ~1200 members (scientists, students, and engineers) from 48 universities and 2 national labs in the US, which constitutes about 27% of the international CMS collaboration. She is a member of the Management Board of the international CMS Collaboration as the representative of the US collaboration. This board is the highest governing body of the CMS Collaboration. Narain served as the “Convener of Upgrade Physics and Performance Studies Group (HL-LHC)” for the international CMS experiment from February 2016-December 2018. In Jan 2013, Narain was appointed the coordinator of Fermilab's LHC Physics Center for CMS, where she has promoted collaboration with colleagues from South America, Europe, India, and Iran, in a peaceful quest for knowledge. She received M.Sc. degree in Physics from IIT, Kanpur and awarded the General Proficiency Prize for Best Outgoing Student in M.Sc. Physics. Prof. Narain joined Brown University, USA as a faculty in 2007, having previously taught at Boston University (USA). She was a postdoctoral fellow at Fermi National Accelerator lab (USA) between 1991-1995 and was awarded the prestigious Wilson Fellowship at Fermilab (USA) following the discovery of the top quark in 1995. Prof. Narain has been actively engaged in STEM outreach activities to encourage participation of young women in science. She served as the founding chair of the "Diversity Committee" of the CMS Experiment from September 2017- August 2018. Her outreach efforts are numerous, e.g. in 2018 and 2019, she spearheaded a pilot program to combine STEM activities with art and design at “WaterFire Providence”. As an affiliate faculty in the Brown University Data Science Initiative and the chair of the Campus Advisory Board, together with her group she actively participates in CS4RI, a RI state initiative for promoting Data Science in RI high schools. IITK conferred upon Prof. Meenakshi Narain the Distinguished Alumnus Award, 2020. She is also a recipient of the Outstanding Junior Investigator Award from the US Department of Energy. She was awarded the Full membership of Sigma Xi, in recognition of scholarly achievements and contributions to the future of science and was appointed the President of the Brown University Chapter in August 2020. She is a recipient of the Brown faculty contact for Khorana-Bose Scholars Program since 2018.

### RESEARCH LED BY THE CAVENDISH LABORATORY HAS IDENTIFIED A MATERIAL THAT COULD HELP TACKLE SPEED AND ENERGY.

Research in the field of light-based computing -- using light instead of electricity for computation to go beyond the limits of today's computers -- is moving fast, but barriers remain in developing optical switching, the process by which light would be easily turned 'on' and 'off', reflecting or transmitting light on-demand. The study, published in Nature Communications, shows that a material known as Ta<sub>2</sub>NiSe<sub>5</sub> could switch between a window and a mirror in a quadrillionth of a second when struck by a short laser pulse, paving the way for the development of ultra-fast switching in computers of the future. The material looks like a chunk of pencil lead and acts as an insulator at room temperature, which means that when infrared light strikes the material in this insulating state, it passes straight through like a window. However, when heated, the material becomes a metal which acts like a mirror and reflects light.

### NOVEL THERMOMETER CAN ACCELERATE QUANTUM COMPUTER DEVELOPMENT

A key component in quantum computers are coaxial cables and waveguides - structures which guide waveforms, and act as the vital connection between the quantum processor, and the classical electronics which control it. Microwave pulses travel along the waveguides to the quantum processor, and are cooled down to extremely low temperatures along the way. The waveguide also attenuates and filters the pulses, enabling the extremely sensitive quantum computer to work with stable quantum states. In order to have maximum control over this mechanism, the researchers need to be sure that these waveguides are not carrying noise due to thermal motion of electrons on top of the pulses that they send. In other words, they have to measure the temperature of the electromagnetic fields at the cold end of the microwave waveguides, the point where the controlling pulses are delivered to the computer's qubits. Working at the lowest possible temperature minimises the risk of introducing errors in the qubits. Until now, researchers have only been able to measure this temperature indirectly, with relatively large delay. Now, with the Chalmers researchers' novel thermometer, very low temperatures can be measured directly at the receiving end of the waveguide-very accurately and with extremely high time resolution.

### NASA’S PERSEVERANCE ROVER LANDS SAFELY ON MARS

NASA’s Perseverance rover has landed on Mars, completing its seven-month journey to the red planet. The Mars 2020 mission will search for signs of ancient microbial life and collect rock samples that will be returned to Earth later in the decade. Perseverance’s arrival marks the end of a busy February for Mars exploration, with the United Arab Emirates and China successfully delivering Mars orbiters earlier this month.

At 20:55 GMT, mission control at the Jet Propulsion Laboratory in California confirmed that the car-sized rover had touched down in the Jezero Crater – a treacherous landscape pockmarked with boulders and steep cliffs. The craft was autonomously guided to the ground by the Terrain Relative Navigation system, which referenced live photos of the surface against a hazard map generated from Mars orbiters.

### MOST DISTINGUISHED PHYSICIST OF INDIA: HC VERMA



Prof. Harish Chandra Verma, one of the most distinguished authors of Physics in India, was born in Darbhanga, Bihar on the auspicious day of Ramnavami in 1952 and spent most of his childhood in Patna. High school education was a mountain for him that he was struggling to cross, but joining Patna Science College after high school proved to be a new direction for him, that made a normal school boy in to a confident and bright adolescent. Often referred to as an 'idol' and the pedagogical 'Guru' for all JEE aspirants, he has written several influential books on Physics and is best known for his two-volume book Concepts of Physics.

The book is considered as the Bible of Physics, a prerequisite for students preparing for IIT JEE or other engineering entrance examinations. He joined reputed Patna Science College as lecturer in 1980. He was asked to teach students at various levels including those in 11th and 12th standard. He observed that even bright students in class are unable to appreciate and enjoy concepts of physics. He contemplated and realized that problem lies in connecting students with the text book he was following, a great book by Resnick and Halliday. The reason was language and cultural differences. The young students from rural background were entangled into language of the book and loose interest before they could reach the concept and its beauty. He could not find an authentic book that makes concepts of physics enjoyable to young Indian students. This motivated him to write the book Concepts of Physics. Besides being a prominent author and researcher, he is an active socialist who has co-founded many social initiatives like Shiksha Sopan, which literally means "a ladder to education" for the growth and upliftment of underprivileged kids in and around IIT campus. Through various centers in the villages around IITK Shiksha Sopan is in direct daily contact with about 250 families. Under the leadership of Prof. Verma, at these centers Indian values and culture are inculcated together with giving them educational help. Apart from the centers, Shiksha Sopan runs various Scholarship programs which helps the poorest of poor to continue education. There were several cases where the family was about to stop the education of a girl child but because of our scholarship the girl could continue education.

Through Pratibha Poshan Yojana, thousands of children from far away villages have identified the best talent hidden in the interiors and give them residential summer camps at IITK. After serving the Patna Science College for over 15 years, he joined the Department of Physics at IIT Kanpur as an Assistant Professor in 1994. Being a true experimentalist and researcher, he did not get convinced by the idea of starting a coaching center and decided to pursue research. His core research interest includes Classical and Quantum Mechanics and Nuclear Physics. Dr. Verma has been awarded prestigious Padma Shri in the year 2020. Anveshika, is essentially an open ended laboratory established in 2014 by a unit of Indian Association of physics Teachers with the efforts of Dr. Verma, where uncommon physics experiments are set up without constraints of any board syllabus or examination. It promotes experimental skills among students and conducts a competition NAEST (National Anveshika Experimental Skill Test) each year. This is probably the only test of its kind in India. He explains in one of his interviews, “Wherever I will be, I will be serving science and education. I will put a Teacher Resource Center where teachers of various subjects from schools and colleges can interact and learn to enjoy the subject they are teaching.”

### COMBINED ENERGY SOURCES RETURN A BURST OF PHOTONS FROM PLASMONIC GOLD NANOGAPS

Rice University physicists came across a phenomenon that boosts the light from a nanoscale device more than 1,000 times greater than they anticipated. When looking at light coming from a plasmonic junction, a microscopic gap between two gold nanowires, there are conditions in which applying optical or electrical energy individually prompted only a modest amount of light emission. Applying both together, however, caused a burst of light that far exceeded the output under either individual stimulus. The researchers led by Rice physicist Douglas Natelson and lead authors Longji Cui and Yunxuan Zhu found the effect while following up experiments that discovered driving current through the gap increased the number of light-emitting "hot carrier" electrons in the electrodes. Now they know that adding energy from a laser to the same junction makes it even brighter. The effect could be employed to make nanophotonic switches for computer chips and for advanced photocatalysts.

### DISCOVERY OF NON-TOXIC SEMICONDUCTORS WITH A DIRECT BAND GAP IN THE NEAR-INFRARED

Scientists have discovered a potentially promising infrared LED and infrared detector component. This compound -- composed of calcium, silicon and oxygen -- is cheap to produce and non-toxic. Many of the existing infrared semiconductors contain toxic chemical elements, such as cadmium and tellurium. The new material may be used to develop less expensive and safer near-infrared semiconductors. Infrared wavelengths have been used for many purposes, including optical fiber communications, photovoltaic power generation and night vision devices. Existing semiconductors capable of emitting infrared radiation (i.e., direct transition semiconductors) contain toxic chemical compounds, such as mercury cadmium telluride and gallium arsenide. Infrared semiconductors free of toxic chemical elements are generally incapable of emitting infrared radiation (i.e., indirect transition semiconductors). It is desirable to develop high-performance infrared devices using non-toxic, direct transition semiconductors with a band gap in the infrared range.



Physics isn't a religion. If it were, we'd have a much easier time raising money.

(Leon M. Lederman)

**IF THE SPEED OF LIGHT IS 983,571,088 FT/SEC, WHAT IS THE SPEED OF DARK?**



## One Day Exhibition on “World Vision 2050 through Science”

One Day Exhibition cum mentorship session on “World Vision 2050 through Science” has been organised on January 22, 2020 for student innovators. Dr Kamaljit Singh, Guru Nanak Dev University, Amritsar was the Chief Guest for the occasion. The event witnessed the participation from more than 25 schools and colleges and the total number of participants was nearly 700. There were two levels for these competitions. Level 1 included participants from 9th to 12th class and Level 2 participants included participants from undergraduate science students. Six interesting and engaging activities included in this event were: Visualise 2050 through still and working model, Flora Expo, Wings to Imagination through Canvas, Enviro Selfie contest, Kaun Banega Scientist, DANscienCE. All activities have galvanised the hidden talent of students, built up their confidence, create awareness and enabled them to face future challenges of the world.



## One day Experimental workshop cum interaction organised

P.G. Department of Physics organized one day Experimental workshop cum interaction by Prof. M.S. Marwaha on February 7, 2020. Dr. Marwaha demonstrated and simplified the complex Mathematics and Physics concepts with easy and interesting experiments. He demonstrated the concept of centrifugal and centripetal forces acting on bodies. He grabbed attention of audience by forming waves on spring and hence explained the concept of various harmonic modes. He also made audience understand about acoustic waves formed in an organ pipe. Further he elaborated concept of coriolis forces exerting on flames of fire, pebbles of different masses in water etc. He elaborated concept of resonance of frequencies by using tuning forks. Experiments involving fire, water, spring were very eye catching and developed curiosity among students. He ended with the words that weak men wait for the opportunities but intelligent men create them.



## Students visited Pushpa Gujral Science City, Kapurthala



About 50 science students of KMV, accompanied with 2 teachers visited science city, Kapurthala on February 10, 2020. Students visited various educational galleries like Earthquake Simulator, Flight simulator, Dome theatre, 3-D show & Climate change theatre etc. They watched models on aircraft & satellites, space shuttles in Space & Aviation Gallery. There were also 100 assorted interactive Fun Science exhibits clustered together on the basis of basic science themes. Students visited to Energy education & Awareness Park where there were various demonstrations regarding various forms of non- conventional energy sources such as Solar energy, wind energy, bio energy & nuclear energy. It was a trip to the place where science, fun & learning are inseparable.

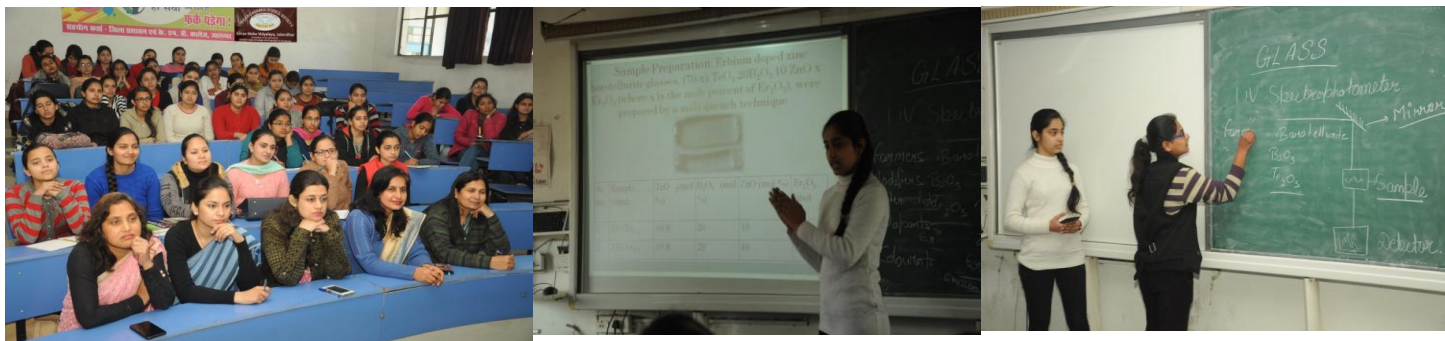
## Six KMV students participated in “PHY Expo2020” at HMV

Students of P.G Dept of Physics participated in PHY Expo2020 organised by HMV, Jalandhar on Feb 11, 2020. 6 students along with 2 teachers visited there. During the exhibition, various competitions & events were organized for the students namely Wings to imagination through canvas, still and working models, quiz contest, Essay writing held in the field of Physics. There were two levels for these competitions. Level 1 included participants from 9th to 12th class and Level 2 participants included participants from undergraduate science students. Our students participated in various events namely model, Quiz and Essay writing. Kmv team won third position in QUIZ CONTEST.



## Training the trainee on Glasses

Student-student mentoring on the topic of synthesis and characterization techniques of rare earth doped glasses was organized on february 15, 2020 by the four B.Sc. Sem-IV students, Kanika, Komal, Anchal and Sakshi, who have visited and worked at Gujarat Borosil Ltd., Bharuch, Gujarat from 25th June 2019 to 9th July 2019. These students further gave hands on training to undergraduate many other students in the college campus. Students synthesized erbium, dysprosium doped rare earth doped glasses and further studied their optical characteristics. Principal Prof. (Dr.) Atima Sharma Dwivedi appreciated such an initiative of physics department for providing students such a vast research exposure.



## Extension Lecture on “Transport properties, measurement Techniques”



An extension lecture on Transport properties, measurement techniques by Dr. Ashish Kumar, DST INSPIRE faculty of Inter University Accelerator Center, New Delhi was organized on February 17, 2020, which was attended by more than 100 Physics students. In his lecture Dr. Ashish focused on basics of semiconductors like pn junction, ideal voltmeter, ammeter sources. He elaborated two and four probe methods to study electrical properties of semiconductors. He made students aware about various characterization devices like Scanning Electron Microscopy SEM, IUAC Pelletron Accelerator etc. available in IUAC, New Delhi. During his lecture, he interacted with students as well as faculty members and answered their queries. He motivated students to write research projects and get fellowships from IUAC, New Delhi. His lecture was very informative and motivating as students got to know about various arenas to do research work.

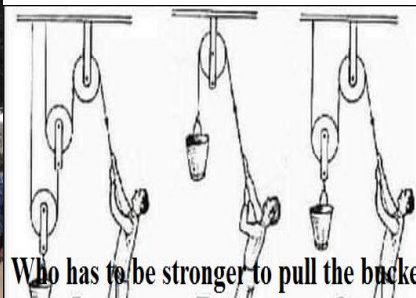
## National Science Day Celebration

National Science Day on the theme “Women in Science” was organized on February 26, 2020. Ms. Anureet a student of M.Sc. Physics gave a presentation on leading prominent women scientists of India, detailing their role in the area of Research and Development. Dr. Suman. B. Beri, Panjab University, Chandigarh delivered a talk on ‘God Particle’. She made students aware of Higgs Boson experiment. Dr. Vandana Bhalla, Guru Nanak Dev University, Amritsar gave talk on ‘Celebrity Science’. She started her talk mentioning everybody is a celebrity, giving example of Tiger Mahii. She discussed about Eureka moment in science by citing example of Archimedes and by Dr. Alexander Fleming. She further added that being scientist is not about studying science but asking right questions and looking for suitable answers.



## Educational Trip To CSIO, Chandigarh

45 students of B.Sc Non medical, Electronics Sem VI visited Central Scientific Instruments Organization (CSIO) , Chandigarh on the occasion of National Science Day. It is one of the constituent laboratories of the Council of Scientific and Industrial Research (CSIR), India, an industrial research and development organization of the country. Students have visited various Labs (Fibre Optics Lab, Opto Chemistry Lab and Motion Sensor Lab) along with the 4 teachers. They were imparted knowledge about the working of various equipments and their applications. Students were given demonstrations of universal alternate drive controllers for assisting specially abled people. Students learned about wheel chair of Dr. Stephen Hawking. Students also visited Material Science Labs where they learnt about working of ellipsometry, Ball milling process. Students were surprised to learn about freezer which can attain temperature of -210C.



## Book Review and Group Discussion Competition

To inculcate reading habits, develop critical thinking skills and improving self-confidence among students, P.G. Department of Physics and Deptt. Of Students welfare organized Book Review and Group Discussion Competition on March 7, 2020. Students were free to present review of books of their interest in their proffered language. Students were given 5-7 mins to review the book. Participants made a review of books like Symptoms of being Human, Kite Runner, Ask me anything, Shayar, Daleep Kaur Tiwana, Plant Tissue culture and Many Mor. Following book review competition, group discussion competition was organized based on the topic “Women Empowerment is a myth or reality” . Women empowerment has become a highly debated social issue not only in India but also around the globe. Students debated that hearing the independent women’s voice and helping the women to ensure that their voices are heard has given rise to #Metoo campaign, NGOs coming forward to safeguard against the women’s emotion abuse.

## Creative e- learning during lockdown

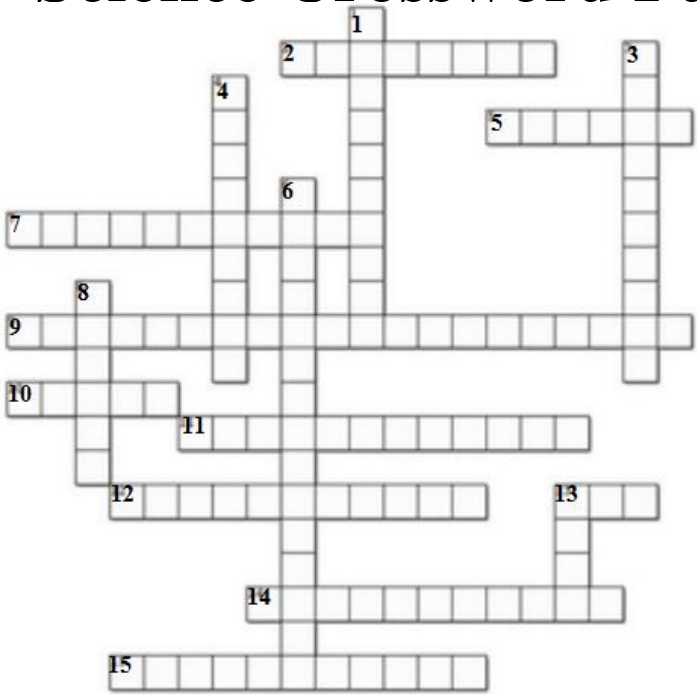
In addition to online teaching during Lockdown, several activities as well as simple experiments were demonstrated by the students of Physics Department in an online workshop organised on April 10, 2020. Students showed many creative activities like to show the attraction and repulsion in cello tape, home-made helicopter, bubble machine using the waste material, electromagnets of their own by using simple material like nails, batteries, wires etc. A Student blows a balloon with the help of ENO dissolved in the lime juice taken in a bottle with balloon on its cap. Students glow an electric bulb by using salt. Such experiments are very useful for sustainable energy production for future generations. Students studied about reflection of light and concluded that light gets refracted or it bends while passing through air glass, water.



What’s light as a feather and a few days after becomes hard as rock?



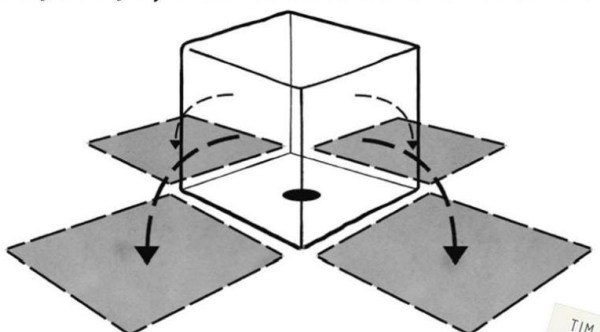
## Science Crossword Puzzles




- Across**
- 2. A band of Colors produced when white light is separated into seven colors
  - 5. Blocks the light passing through
  - 7. Let the light pass through so that objects on other side could be visible.
  - 9. A wave consists electric and magnetic field
  - 10. A cut piece of clear glass or plastic that separate white light into a band of colours
  - 11. A lens that curves inward and spreads light rays apart
  - 12. Let a small amount of light pass through
  - 13. An organ allowing living organisms to hear
  - 14. A region of sound wave where particles are far apart.
  - 15. A region of sound wave where particles are close together.

Could YOU be an astronaut?

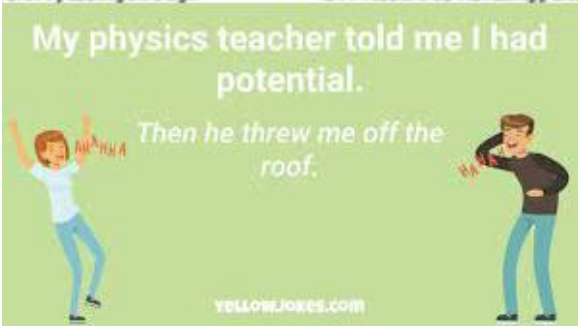
Here's a mental challenge that Tim had to answer in his selection process: Imagine that you are facing a cube. This cube can roll to the left, right, forward (towards you) or backwards (away from you). There is a dot on the bottom of the cube.



Now in your mind, roll the cube: forward, left, left, forward, right, backwards, right. Where's the dot?



- Down**
- 1. The bending of a wave as it passes between two substances
  - 3. Pressure of vibrating particles caused by something vibrating.
  - 4. A periodic back and forth motion
  - 6. A wave that requires a medium to travel
  - 8. A substance a wave travels through
  - 13. The repetition of a sound caused by reflection of sound waves off of a surface



## There Will Come Soft Rains Story time

In the living room the voice-clock sang, Tick-tock, seven o'clock, time to get up, time to get up, seven o'clock! as if it were afraid that nobody would. The morning house lay empty. The clock ticked on, repeating and repeating its sounds into the emptiness. Seven-nine, breakfast time, seven-nine! In the kitchen the breakfast stove gave a hissing sigh and ejected from its warm interior eight pieces of perfectly browned toast, eight eggs sunny side up, sixteen slices of bacon, two coffees, and two cool glasses of milk. "Today is August 4, 2026," said a second voice from the kitchen ceiling, "in the city of Allendale, California." It repeated the date three times for memory's sake. "Today is Mr. Featherstone's birthday. Today is the anniversary of Tilita's marriage. Insurance is payable, as are the water, gas, and light bills." Somewhere in the walls, relays clicked, memory tapes glided under electric eyes. Eight-one, tick-tock, eight-one o'clock, off to school, off to work, run, run, eight-one! But no doors slammed, no carpets took the soft tread of rubber heels. It was raining outside. The weather box on the front door sang quietly: "Rain, rain, go away; umbrellas, raincoats for today. ..." And the rain tapped on the empty house, echoing. Outside, the garage chimed and lifted its door to reveal the waiting car. After a long wait the door swung down again. At eight-thirty the eggs were shrivelled and the toast was like stone. An aluminium wedge scraped them into the sink, where hot water whirled them down a metal throat which digested and flushed them away to the distant sea. The dirty dishes were dropped into a hot washer and emerged twinkling dry. Nine-fifteen, sang the clock, time to clean. Out of warrens in the wall, tiny robot mice darted. The rooms were a crawl with the small cleaning animals, allrubber and metal. They thudded against chairs, whirling their moustached runners, kneading the rug nap, sucking gently at hidden dust. Then, like mysterious invaders, they popped into their burrows. Their pink electric eyes faded. The house was clean. Ten o'clock. The sun came out from behind the rain. The house stood alone in a city of rubble and ashes. This was the one house left standing. At night the ruined city gave off a radioactive glow which could be seen for miles. Ten-fifteen. The garden sprinklers whirled up in golden founts, filling the soft morning air with scatterings of brightness. The water pelted window panes, running down the charred west side where the house had been burned, evenly free of its white paint. The entire west face of the house was black, save for five places. Here the silhouette in paint of a man mowing a lawn. Here, as in a photograph, a woman bent to pick flowers. Stillfarther over, their images burned on wood in one titanic instant, a small boy, hands flung into the air; higher up, the image of a thrown ball, and opposite him a girl, hands raised to catch a ball which never came down. The five spots of paint - the man, the woman, the children, the ball- remained. The rest was a thin charcoaled layer. The gentle sprinkler rain filled the garden with falling light. Until this day, how well the house had kept its peace. How carefully it had inquired, "Who goes there? What's the password?" and, getting no answer from lonely foxes and whining cats, it had shut up its windows and drawn shades in an old-maidenly preoccupation with self-protection which bordered on a mechanical paranoia. It quivered at each sound, the house did. If a sparrow brushed a window, the shade snapped up. The bird, startled, flew off! No, not even a bird must touch the house! Twelve noon. A dog whined, shivering, on the front porch. The front door recognized the dog voice and opened. The dog, once huge and fleshy, but now gone to bone and covered with sores, moved in and through the house, tracking mud. Behind it whirred angry mice, angry at having to pick up mud, angry at inconvenience. For not a leaf fragment blew under the door but what the wall panels flipped open and the copper scrap rats flashed swiftly out. The offending dust, hair, or paper, seized in miniature steel jaws, was raced back to the burrows. There, down tubes which fed into the cellar, it was dropped into the sighing vent of an incinerator which sat like evilBaal in a dark corner. The dog ran upstairs, hysterically yelping to each door, at last realizing, as the house realized, that only silence was here. It sniffed the air and scratched the kitchen door. Behind the door, the stove was making pancakes which filled the house with a rich baked odour and the scent of maple syrup. The dog frothed at the mouth, lying at the door, sniffing, its eyes turned to fire. It ran wildly in circles, biting at its tail, spun in a frenzy, and died. It lay in the parlor for an hour. Two o'clock, sang a voice. Delicately sensing decay at last, the regiments of mice hummed out as softly as blown gray leaves in an electrical wind.

Two-fifteen.

CONTINUE...

## Fun Times with Physics

### Online course on “Advanced Course on Special Theory of Relativity” by Prof. HC Verma

Two faculty members of department enrolled for online course on the topic “Advanced Course on Special Theory of Relativity” conducted by Prof. HC Verma of IIT, Kanpur. These students and teachers have been provided certificates by CDTE, IIT Kanpur. This course include the phenomena leading to the development of quantum mechanics, photoelectric effect, compton effect, wave particle duality, de-Broglie matter waves, operators corresponding to measurable quantities and their expectation values, etc. the course run from26 Jan to 19 May, 2020, which includes lectures and assignments. The certificate was also provided to the students who have visited atleast 90% of the videos.

### Science of COVID-19 and Vaccines

An online webinar on “Science of COVID-19 and Vaccines explained” was organized on May 8, 2020. The webinar was addressed by Prof. (Dr.) L. S. Shashidhara, a renowned biologist, Dean Research, Ashoka University, New Delhi. Starting from the nomenclature of COVID-19, Prof. Shashidhara explained the detailed structure of novel corona virus, its origin and its spread in human beings. He also threw light on methods and modes of transmission of novel corona virus in humans. Elaborating the role of personal hygiene, he explained how soap kills the virus by breaking its cell wall and thus making it ineffective. He shared that research in many countries is under way to develop an effective vaccine against this virus, which may take some time to come to the market.



### Learning By Doing – Fun With Physics

To help students stay in touch with their studies amidst Sar-Cov-2 pandemic, students have been engaged in learning by doing. Students were guided to do simple projects with the material easily available at their homes. Students learnt to do copper plating on any brass object with the help of electricity. They also devised a Zoetrope that creates animation through the illusion of the motion from static pictures. You see that the images you place in the zoetrope are motionless. students brought a geyser animation to life by building their own zoetrope kit. Students studied the phenomenon of convection using water. Some of them constructed periscope which is an aid to look in a certain directions from different positions. By performing experiment on heat conduction with candle, students found the conduction of heat in different metals. As one end of the metal rod (knife) got hot rather than the entire rod. Students devised homemade Barometer to show changes in air pressure. Their investigation using barometer revealed t



### ACCIDENTAL DISCOVERIES IN PHYSICS

Originally found in the bark of the cinchona tree, the discovery of this important anti-malarial compound was a pure accident. While it was being used by Jesuit missionaries in South America to treat malaria since 1600, they were taught about the substance by native Andean peoples in the first place. According to their legends, the first discoverer was a feverish Andean man who was lost in the jungle. Suffering from malaria, he drank from a pool of water at the base of a cinchona tree. Although bitter to the taste, his fever lifted and he survived to pass on what he had learned.

**The confounded tackle.** Every so often ingenious tinkers try to improve on Archimedes. Here's a clever variation on standard pulley systems. Calculate its mechanical advantage, assuming frictionless, massless pulleys and perfectly flexible rope of negligible mass.



### RIDDLE FOR FUN

- You first look in the mirror and see what you saw, take the saw and cut the table in half, two halves make a hole, jump through the hole and YOU'RE OUT!
- The man and the chicken cross the river, (the fox and corn are safe together), he leaves the chicken on the other side and goes back across. The man then takes the fox across the river, and since he can't leave the fox and chicken together, he brings the chicken back. Again, since the chicken and corn can't be left together, he leaves the chicken and he takes the corn across and leaves it with the fox. He then returns to pick up the chicken and heads across the river one last time.
- Place 4 pills on each side of the balance. Discard the 4 with the lighter/lesser weight. Then place 2 of the remaining 4 on each side. Again, discard the lighter side. You now have 2 pills, and one is poisonous. To be certain, it'd be nice to use the scale again to be sure, but it should be apparent which is heavier without doing so. For any number n of items like this, the number of measurements needed to find the unique object is always log(base2) of n. So for 8 pills we would need 3 measurements to be certain we find the unique object. If you only had 7, you could find the unique one by removing one and measuring the remaining 3v3. If they are equal, the first was poisonous. If not, discard the lesser weight, place 2 on one side and the other, along with the first, on the other side. Now we can follow the first procedure. This process can find the poisonous pill in any number n of pills given log(base 2) of n measurements.

#### Science Crossword Puzzles

##### Across

1. Earthquake    5. Crust    6. Fault    8. Seismograph    10. Disaster    11. Waves

##### Down

2. Tsunami    3. Aftershock    4. NorthRidge    7. Damage    8. Seismic    9. Richter